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Architecture of the Eurasian Steppe: Continuities, Contrasts, and Lessons for Sustainable Regionalism

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Abstract. This article explores the architecture of the Eurasian steppe as a field of ecological reasoning and regional design intelligence. Rather than focusing on stylistic or symbolic aspects of cultural identity, it examines how vernacular traditions across the steppe-spanning from Inner Mongolia to Eastern Europe-articulate shared strategies of material economy, spatial compactness, and environmental adaptation. Drawing on a wide range of architectural literature and theoretical frameworks, the study positions the steppe not as a collection of isolated ethnographic cases, but as a coherent ecological zone with latent architectural continuity. The concept of ecological regionalism is proposed as a lens through which vernacular strategies can be understood as generative rather than nostalgic. Historical figures such as Frank Lloyd Wright, Hassan Fathy, and Balkrishna Doshi are discussed as precedents for integrating local materials and climate responsiveness into modern design thinking. While several recent projects are briefly cited as illustrations, the article's primary aim is theoretical: to situate the architecture of the Eurasian steppe within broader discourses on sustainability, regional identity, and place-based architectural logic.

Keywords: *Eurasian steppe, ecological regionalism, vernacular strategies, architectural theory, material adaptation, passive systems, climate-responsive design, regional identity.*

1. Introduction

In the context of accelerating globalization, architecture has increasingly been shaped by processes of homogenization, technological standardization, and market-driven aesthetics. The spread of international styles, driven by global capital flows, corporate design firms, and algorithmically optimized construction, has led to a growing detachment of buildings from their environmental, cultural, and material contexts. From steel-and-glass towers in desert cities to generic residential blocks repeated across continents, much of contemporary architecture reflects a tendency toward placelessness—an aesthetic of efficiency that often disregards ecological appropriateness and local specificity. Critics have argued that this global convergence erodes regional identities and undermines the environmental resilience embedded in traditional building practices.

In response to this condition, architects and theorists have turned renewed attention toward regional traditions—not as nostalgic templates or decorative motifs, but as sources of ecological intelligence, material pragmatism, and cultural continuity. Particularly in its «critical» and ecological forms, regionalism has emerged as a strategy for re-engaging architecture with its surroundings. It emphasizes the integration of design with climate, topography, and local building knowledge, challenging the dominance of abstract formalism and technocratic universality [1, 2]. Rather than seeking authenticity through superficial historicism, such approaches advocate for new architectural languages that are both grounded in place and responsive to contemporary needs—balancing innovation with continuity, and performance with identity.

The Eurasian steppe, one of the world's largest continuous ecological zones, offers a unique yet underexplored field for investigating such approaches. Extending from the Hungarian plains and the southern Urals through Kazakhstan and Mongolia to northern China, the steppe is characterized by vast open landscapes, extreme seasonal climates, low rainfall, and a long history of nomadic and semi-nomadic habitation. While the cultural traditions across this belt are remarkably diverse, they have historically been shaped by shared environmental constraints, economic practices (notably pastoralism), and the scarcity of durable resources.

Despite this, the steppe has seldom been conceptualized as an architectural region in its own right. Vernacular dwellings—such as the Mongolian ger, the Chinese yaodong (Figure 1) [3], or the earthen houses of Central Asia—are typically treated in isolation within national or ethnic frameworks. Yet these forms display striking parallels in their climatic adaptations, spatial logic, and material use, suggesting the possibility of a broader ecological and architectural continuity. This article proposes to examine the steppe not as a collection of discrete traditions, but as a spatial and ecological logic that can inform contemporary architectural thinking.

Rather than focusing on stylistic motifs or symbolic representations of cultural identity, this study investigates how vernacular practices of the steppe region offer design principles that are materially grounded, climatically responsive, and ecologically sustainable. Through a critical review of architectural literature, both historical and contemporary, the article identifies a set of recurring strategies—related to materials, spatial organization, and environmental adaptation—that transcend national boundaries. Historical examples from figures such as Frank

Lloyd Wright, Hassan Fathy, and Balkrishna Doshi demonstrate how such principles have been successfully translated into modern architectural forms across varied contexts.

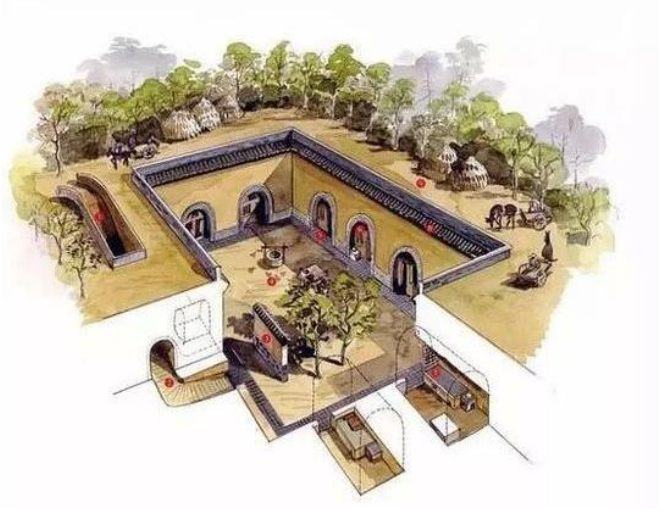

Figure 1. Traditional Chinese yaodong house (cave dwelling). Source: Li Qianlang. Chuan qiang tou bi [3]

Although the article draws upon several contemporary architectural projects as brief illustrations, the focus remains theoretical and synthetic: to articulate a conceptual framework of ecological regionalism grounded in the spatial intelligence of the Eurasian steppe. In doing so, it seeks to contribute to ongoing discussions in architectural theory about the relationship between climate, culture, and design—while also proposing a new way of reading a vast and often overlooked geographical zone.

2. Materials and methods

2.1. Literature and Conceptual Background

Although the Eurasian steppe has long been recognized as a cultural and geopolitical formation—often referred to as the «Great Steppe» in Central Asian historiography or simply the «Eurasian grassland belt» in ecological studies—its architectural character remains understudied in global design discourse. While works in geography and anthropology have emphasized the steppe's role in shaping patterns of mobility, pastoralism, and environmental adaptation [4,5], architectural scholarship has rarely treated it as a coherent field of design inquiry.

Nonetheless, scattered studies of vernacular architecture across different regions of the steppe—ranging from the semi-nomadic structures of Inner Mongolia to the adobe and mudbrick houses of southern Kazakhstan—reveal significant continuities. Scholars such as Amos Rapoport (1969) and Paul Oliver (1997) have emphasized the role of environmental pressures in shaping vernacular forms across similar ecologies [6,7]. More recent studies explore specific techniques—like thick earthen walls, sunken courtyards, or wind-capturing chimneys—that recur across disparate steppe contexts [8,9]. Further ethnographic work by Rohland et al. (2025) emphasizes the influence of mobile settlement structures and temporary enclosures in shaping spatial rhythms and collective infrastructure, reinforcing the idea that transience itself becomes a formal logic [10].

This literature challenges the notion that architectural identity must be tied to monumental symbolism or cultural iconography. Instead, it offers a different kind of continuity—one based on climate-responsive pragmatism, material logic, and spatial economy. In this sense, the steppe provides fertile ground for the development of what could be called a functional regionalism, where place-based design strategies arise not from abstract ideology but from situated intelligence accumulated over generations.

Such thinking resonates with broader currents in architectural theory. Kenneth Frampton's notion of critical regionalism (1983) [1], though developed in opposition to both modernist universalism and vernacular revivalism, emphasized the importance of tactile, material engagement with place. Later theorists expanded this framework by integrating environmental and climatic considerations, developing what might be termed ecological regionalism—an approach that situates design within natural and cultural systems without resorting to essentialism or folkloric aesthetics [2; 11]. In this context, Asadpour (2020) has proposed a conceptual model for interpreting vernacular environments not as static typologies but as dynamic adaptive systems, capable of generating new spatial logics in response to change [12].

Historical examples offer important precedents. Frank Lloyd Wright's emphasis on local materials and integration with the landscape, Hassan Fathy's reinterpretation of earthen techniques in Egyptian village housing, and Balkrishna Doshi's work on socially responsive, low-cost environments in India all exemplify how vernacular principles can be retooled to address modern challenges without losing their spatial intelligence. These architects treated climate, material availability, and local practice not as constraints but as design opportunities [13,14].

Moreover, the performative value of vernacular spatial organization is increasingly supported by empirical studies. Keshtkaran (2011), for instance, documents how courtyard geometries and material layering in Iranian desert settlements contribute to thermal comfort and microclimate regulation—findings that closely parallel strategies observed across the steppe. Such analyses help reinforce the idea that vernacular solutions are not anecdotal but measurable and replicable [15].

From this perspective, the Eurasian steppe should be understood not as a stylistic region but as a field of architectural reasoning—one that privileges adaptation over form, performance over image. While direct scholarly treatments of the steppe as a unified architectural system are rare, the dispersed studies reviewed here point toward a latent coherence: a set of principles that recur across cultures, reinforced not by cultural nationalism but by environmental necessity.

This article therefore builds on these sources to systematize the ecological and spatial strategies common to steppe traditions, while also positioning them within broader architectural debates about sustainability, locality, and identity. The following section identifies and synthesizes these strategies into a working framework.

3. Results and discussion

3.1. Architectural Strategies of the Steppe Region

Vernacular architecture in the Eurasian steppe has evolved not from aesthetic ideologies or symbolic systems, but through pragmatic responses to a demanding and often unforgiving environment. Scarce rainfall, intense solar exposure, strong seasonal winds, and dramatic temperature fluctuations have consistently shaped how people build, live, and

organize space across this region. Though ethnically and culturally diverse, settlements across the steppe demonstrate recurring spatial and material strategies that form a coherent ecological logic.

This section synthesizes these recurring strategies into three overlapping domains: material systems, spatial configurations, and environmental adaptations. These categories are not mutually exclusive; rather, they represent intersecting logics that emerge from vernacular building traditions and remain relevant in contemporary practice.

Material Systems: Economy and Locality

A defining feature of steppe architecture is its reliance on locally available, low-embodied-energy materials that are easy to extract, shape, and repair. These include:

- Earth-based materials: adobe, rammed earth, clay bricks, and loess are widespread, used for their thermal mass, affordability, and insulation properties.
- Stone and rubble: especially in regions closer to the mountains or rocky outcrops, dry masonry and fieldstone construction provide structural durability without complex processing.
- Timber and reeds: in river valleys or forest-steppe zones, timber framing and reed thatching complement earthen construction, especially in roof systems.
- Felt, canvas, and textile: in mobile and semi-nomadic structures like yurts, felted wool and woven coverings serve both as weatherproofing and spatial dividers.

The guiding principle across all these materials is minimum transformation, maximum performance—resources are used in the form closest to their natural state, and shaped to optimize thermal comfort and structural stability.

Spatial Configurations: Shelter, Containment, and Transition

Steppe dwellings are typically organized around protection, compactness, and thermal inertia. Three spatial logics recur throughout the region:

- Inward orientation: homes often center around courtyards or introverted layouts that protect against wind and sand, provide microclimates, and support social interaction.
- Compact geometry: circular, square, or cellular forms reduce surface-to-volume ratio, limiting heat loss and gain.
- Layered thresholds: spatial transitions from exterior to interior are gradual, marked by semi-enclosed galleries (ayvans), covered porches, or entry vestibules, which regulate temperature and dust.
- Roof use: in some contexts, flat or low-pitched roofs serve as seasonal extensions of living space—used for sleeping, storage, or food drying.

Rather than architectural grandeur, these layouts prioritize environmental efficiency and daily use, producing spatial systems that are both resilient and socially legible.

Environmental Adaptations: Passive Climatic Intelligence

Perhaps most striking is the depth of environmental adaptation embedded in traditional steppe buildings. Centuries of empirical knowledge have resulted in strategies that anticipate many principles now associated with sustainable or bioclimatic design:

- Thermal mass and insulation: thick earthen walls delay heat transfer, stabilizing interior temperatures across day-night cycles.
- Subterranean space: partially sunken rooms or cellars regulate extreme heat and cold, while also storing water or food.
- Ventilation and air movement: narrow openings, clerestories, and chimney-like wind towers enable cross-ventilation and stack effect cooling.
- Solar orientation: buildings are often aligned to minimize exposure on windward sides while maximizing winter sun access.
- Surface treatment: natural plasters, whitewashed exteriors, and textured surfaces control reflectivity and help regulate humidity.

These are not isolated tricks but part of a systemic ecological logic—embedded in practice, refined through observation, and passed down across generations.

Together, these material, spatial, and climatic strategies constitute a form of evolved design intelligence that is not static or «primitive», but dynamic and regionally adaptive. While each local tradition varies in form and culture, they collectively point to a coherent architectural reasoning tied to the steppe environment.

The following section explores how these principles have been reinterpreted or revived in contemporary architectural discourse—not through direct imitation of form, but through abstraction, simplification, and renewed material engagement.

3.2. Contemporary Relevance: Toward Ecological Regionalism

The architectural intelligence embedded in vernacular traditions of the Eurasian steppe is not confined to the past. As ecological awareness and resource constraints intensify, architects worldwide are revisiting the lessons of place-based design—not as nostalgic gestures, but as frameworks for material economy, spatial logic, and environmental performance. In this context, the concept of ecological regionalism has emerged as a useful lens to describe contemporary architecture that draws on vernacular strategies without resorting to historicist or symbolic forms.

Unlike decorative regionalism, which often reproduces recognizable motifs and heritage iconography, ecological regionalism operates at a deeper level. It focuses on design processes and performance, emphasizing:

• local materials used with minimal transformation,

• passive environmental strategies derived from climatic conditions,

• forms shaped by landscape and function rather than cultural metaphor,

• and spatial typologies that reflect patterns of use, movement, and social structure.

Across the Eurasian steppe, several recent architectural projects illustrate how this approach can be deployed in modern practice. Though differing in scale, language, and context, they share a commitment to environmental logic over visual pastiche.

The Hui Space in West Wusutu Village (Inner Mongolia), designed by Zhang Pengju, adapts traditional courtyard principles to create layered microclimates and shaded communal zones using compressed earth blocks and wind-buffering geometry. The building's abstract formal language avoids explicit cultural symbolism, relying instead on its material presence and spatial sequencing to evoke a sense of place.

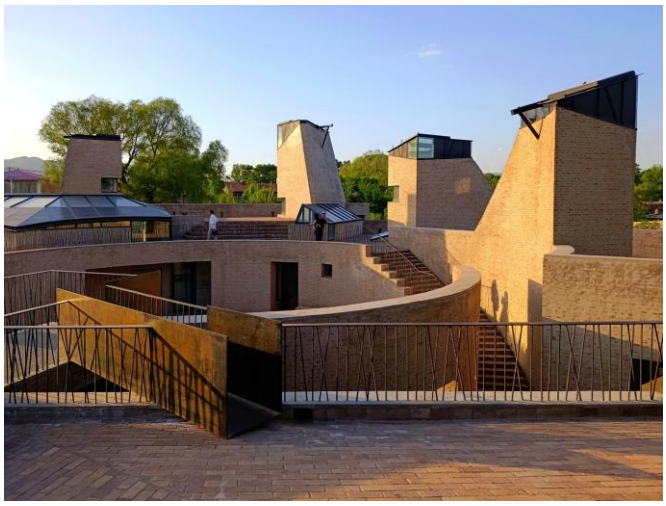

Figure 2. The Hui Space in West Wusutu Village, Inner Mongolia. Photo by the author

In Kazakhstan, the Korkyt Ata Memorial Complex engages the surrounding steppe through earth-hued materials, a low horizontal profile, and symbolic spatial progression. Though commemorative in nature, the architecture reflects regional values of openness, groundedness, and interaction with landscape, rather than architectural ornament.

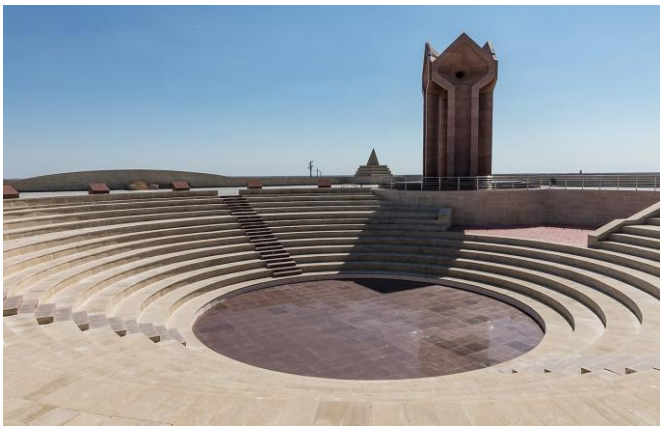

Figure 3. Korkyt Ata Memorial in Kyzylorda Region, Kazakhstan. Source: Wikimedia Commons, photo by Beresnev (CC BY-SA 4.0)

Further west, in Russia's Ugra National Park, the Selpo Pavilion by Nikolay Polissky translates steppe tectonics into a playful, low-tech structure made of bundled sticks and agricultural mesh. Its temporary, porous quality resonates with the idea of mobility and ephemerality common to steppe traditions, while avoiding folkloric reference.

Figure 4. SELPO pavilion by Nikolay Polissky, Russia. Photo by Alexey Naroditskiy. Source: polissky.ru

These projects do not attempt to recreate the forms of yurts or fortress houses. Instead, they abstract and recontextualize the underlying principles of vernacular logic—thermal mass, spatial containment, porous edges, and landscape anchoring—within contemporary constraints and possibilities.

In doing so, they demonstrate that regional architecture need not be formally traditional in order to be culturally and ecologically grounded. What emerges is a form of design that is at once critical and humble: respectful of inherited knowledge, but committed to adaptation rather than replication.

4. Conclusions

This article has explored the Eurasian steppe not merely as a geographic expanse, but as a conceptual and ecological field that supports a distinct logic of architectural reasoning. Through a critical review of vernacular traditions and their shared environmental strategies, we have identified a recurring set of material, spatial, and climatic principles that transcend national and cultural boundaries.

Rather than presenting these traditions as static heritage or exotic exception, we propose that they represent a form of environmental intelligence—deeply rooted in place, shaped by necessity, and tested over time. In this view, steppe architecture is not defined by formal consistency, but by adaptive coherence: the ability to respond to climate, material availability, and social organization with minimal means and maximal performance.

Contemporary architecture, in seeking alternatives to both global homogeneity and shallow historicism, stands to benefit from such a framework. The concept of ecological regionalism, as outlined in this study, offers a path toward grounded, resilient, and expressive design that honors place without becoming trapped by it. It calls for a return not to past forms, but to the underlying logics of place-making: passive climate control, material honesty, spatial economy, and landscape integration.

By briefly examining recent projects in China, Kazakhstan, and Russia, we have shown how these ideas can be translated into contemporary language—without resorting to folkloric mimicry or high-tech dependence. While these examples are not exhaustive, they point to a broader design attitude: one that treats vernacular strategies as open systems, available for reinterpretation and innovation.

Future research might deepen this inquiry through more detailed comparative analyses across the steppe belt, integrating ethnographic fieldwork, performance assessment, and interdisciplinary collaboration. Equally, educational curricula and design practices could benefit from reframing vernacular architecture not as static reference, but as living knowledge—a toolkit for sustainable futures grounded in the lessons of the land.

Ultimately, the steppe offers more than architectural artifacts; it offers a way of thinking. And in an age of planetary crisis, such thinking may prove not only relevant, but essential.

Acknowledgements

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References

[1] Frampton, K. (1983). Critical Regionalism: Six Points for an Architecture of Resistance. The Anti-Aesthetic: Essays on Post-modern Culture. *Port Townsend: Bay Press*

[2] Canizaro, V. (2007). Architectural Regionalism: Collected Writings on Place, Identity, Modernity, and Tradition. *New York: Princeton Architectural Press*

[3] Li, Qianlang. (2008). Chuan qiang tou bi [Penetrating Walls and Structures]. *Beijing: China Architecture & Building Press*

[4] Kradin, N.N. (2003). Nomads of the Eurasian Steppes in the Early Iron Age. *Moscow: Eastern Literature Press*

[5] Rogers, D. (2020). Steppes: The Architecture of Eurasian Mobility. *Architectural Review, 1475, 45–52*

[6] Rapoport, A. (1969). House Form and Culture. *Englewood Cliffs: Prentice-Hall*

[7] Oliver, P. (1997). Encyclopedia of Vernacular Architecture of the World. In 3 vols. *Cambridge: Cambridge University Press*

[8] Li, Y., Zhang, H., Wang, X. (2023). Thermal performance of semi-sunken loess cave dwellings in China: A vernacular approach to passive cooling. *Sustainable Cities and Society, (91), 104406.* https://doi.org/10.1016/j.scs.2022.104406

[9] Zhang, P., Bai, J. (2017). The Logic of Earth and Air: Revisiting Vernacular Architecture in the Chinese Steppe. *Journal of Asian Architecture and Building Engineering, 16(2), 271–278.* https://doi.org/10.3130/jaabe.16.271

[10] Rohland, E., Sausmikat, N., Erdenebaatar, D. (2025). Nomadic Landscapes and Mobile Architecture in Eastern Eurasia: Cultural Strategies and Spatial Practices. *Steppe Studies Journal, 4(1), 22–39*

[11] Vale, B., Vale, R. (1991). Green Architecture: Design for a Sustainable Future. *London: Thames and Hudson*

[12] Asadpour, A. (2020). Defining the Concepts & Approaches in Vernacular Architecture Studies. *Nature: National Academic Journal of Architecture, 7(2), 241–255*

[13] Fathy, H. (1986). Natural Energy and Vernacular Architecture: Principles and Examples with Reference to Hot Arid Climates. *Chicago: University of Chicago Press*

[14] Doshi, B.V. (2019). Paths Uncharted. *Ahmedabad: Vastu-Shilpa Foundation*

[15] Keshtkaran, N. (2011). Harmonization between Climate and Architecture in Vernacular Heritage: A Case Study in Yazd, Iran. *Procedia Engineering, (21), 428–438*

Еуразиялық дала сәулеті: сабақтастық, айырмашылықтар және тұрақты өңірлік сәулет үшін сабақтар

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Аңдатпа. Бұл мақалада Еуразия даласының сәулеті экологиялық логика мен өңірлік жобалау тәсілдерінің өрісі ретінде қарастырылады. Мәдени сәйкестіктің стилистикалық немесе символикалық қырларына емес, Еуразия даласында — Ішкі Моңғолиядан Шығыс Еуропаға дейін — таралған дәстүрлі сәулет тәжірибелерінің ортақ стратегияларына назар аударылады. Оларға материалдарды үнемді пайдалану, кеңістікті ықшам ұйымдастыру және қоршаған ортаға бейімделу жатады. Кең ауқымды теориялық және әдеби дереккөздерге сүйене отырып, бұл жұмыс даланы этнографиялық ерекшеліктер жиынтығы емес, жасырын архитектуралық сабақтастыққа ие біртұтас экологиялық аймақ ретінде ұсынады. Мақалада «экологиялық өңіршілдік» ұғымы ұсынылып, дәстүрлі тәжірибелерді ретроспективалық емес, генеративті ресурс ретінде қарастыру көзделеді. Фрэнк Ллойд Райт, Хассан Фатхи және Балкришна Дошидің еңбектері жергілікті материалдар мен климаттық шешімдерді қазіргі сәулетке интеграциялаудың мысалдары ретінде талданады. Бірқатар заманауи жобалар қысқаша сипатталғанымен, мақаланың басты мақсаты – Еуразия даласының сәулетін орнықты даму, өңірлік сәйкестік және кеңістікке негізделген жобалау дискурсына енгізу.

Негізгі сөздер: *Еуразия даласы, экологиялық өңіршілдік, дәстүрлі стратегиялар, сәулет теориясы, материалдарға бейімделу, пассивті жүйелер, климатқа бейімделген жобалау, өңірлік сәйкестік.*

Архитектура Евразийской степи: преемственность, контрасты и уроки для устойчивого регионализма

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Аннотация. В данной статье Евразийская степь рассматривается как архитектурное и экологическое пространство, формирующее особую логику проектирования. Исследование акцентирует внимание не на стилевых или символических аспектах культурной идентичности, а на том, как вернакулярные архитектурные традиции — от Внутренней Монголии до Восточной Европы — реализуют общие стратегии ресурсной экономии, компактности и климатической адаптации. Основываясь на обширном опыте архитектурной теории и литературы, авторы интерпретируют степь не

как набор разрозненных этнографических зон, а как экологически целостную зону с внутренней архитектурной логикой. В качестве теоретической рамки предлагается концепция «экологического регионализма», позволяющая рассматривать вернакулярные подходы как источник генеративных, а не ретроспективных решений. В статье также рассматриваются работы Фрэнка Ллойда Райта, Хассана Фати и Балкришны Доши как примеры интеграции местных материалов и климатических стратегий в современное архитектурное мышление. В статье кратко упоминаются некоторые современные архитектурные проекты иллюстрирующие проявления регионализма в разных частях Евразийской степи, однако её основная цель — теоретическое осмысление архитектурного потенциала Евразийской степи в контексте устойчивого развития, региональной идентичности и архитектуры, отвечающей особенностям своего расположения.

Ключевые слова: *Евразийская степь, экологический регионализм, вернакулярные стратегии, архитектурная теория, адаптация материалов, пассивные системы, климатически адаптивный дизайн, региональная идентичность.*

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